Game Changing Development

Nuclear Thermal Propulsion (NTP)

Completed Technology Project (2016 - 2020)

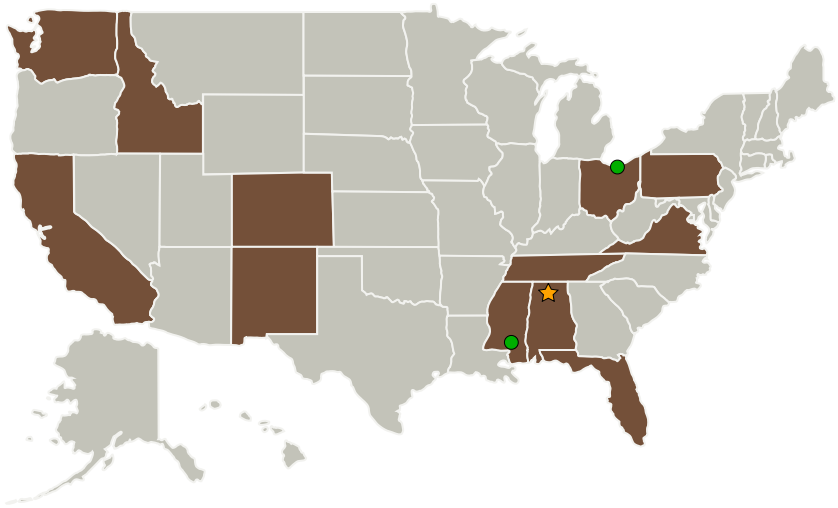
Project Introduction

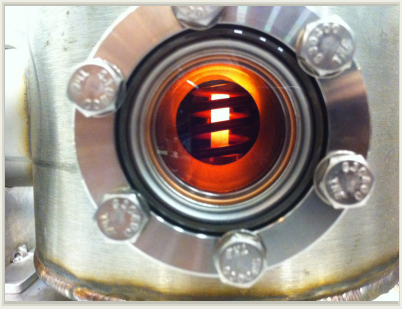
The goal of the Nuclear Thermal Propulsion (NTP) technology development task is to determine the feasibility and affordability of using low enriched uranium (LEU) to power engines on a space transportation vehicle with solid cost and schedule confidence. This effort leverages government, industry and academic expertise to establish a conceptual design for a nuclear-powered rocket engine in the thrust range of interest for a human Mars mission.

Anticipated Benefits

Nuclear propulsion technology enables missions where solar-powered and chemical systems are limited. Faster transit propulsion for planetary missions combined with lowest total mission mass compared to chemical and solar electric. Improves crew safety. Nuclear propulsion technology provides a high-thrust, high-specific impulse capability that increases mission flexibility in cis-lunar space.

Primary U.S. Work Locations and Key Partners





Part of NASA's Game Changing Development Program, the Nuclear Thermal Propulsion (NTP) project could indeed significantly change space travel, largely due to its ability to accelerate a large amount of propellant out of the back of a...

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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
ACENT Laboratories LLC	Supporting Organization	Industry	Manorville, New York
Florida Turbine Technologies, Inc.	Supporting Organization	Industry	Jupiter, Florida
●Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio
Idaho National Laboratory(INL)	Supporting Organization	R&D Center	Idaho Falls, Idaho
Los Alamos National Laboratory(LANL)	Supporting Organization	R&D Center	Los Alamos, New Mexico
Oak Ridge National Laboratory(ORNL)	Supporting Organization	R&D Center	Oak Ridge, Tennessee
Quest Thermal Group	Supporting Organization	Industry	Arvada, Colorado
●Stennis Space Center(SSC)	Supporting Organization	NASA Center	Stennis Space Center, Mississippi
Ultra Safe Nuclear Corporation	Supporting Organization	Industry	Seattle, Washington
Ultramet	Supporting Organization	Industry	Pacoima, California

Primary U.S. Work Locations	
Alabama	California
Colorado	Florida

Continued on following page.

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Game Changing Development

Project Management

Program Director:

Mary J Werkheiser

Program Manager:

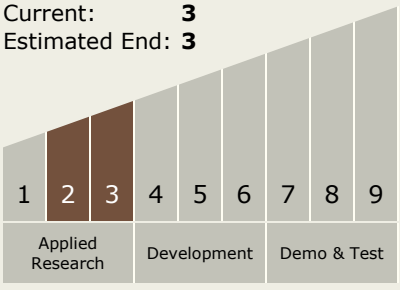
Gary F Meyering

Principal Investigator:

Michael H Kynard

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Primary U.S. Work Locations *(cont.)*	
Idaho	Mississippi
New Mexico	Ohio
Pennsylvania	Tennessee
Virginia	Washington

Project Transitions

January 2016: Project Start

April 2020: Closed out

Closeout Summary: The Nuclear Thermal Propulsion project was transitioned i nto the Technology Mission Directorate (TDM) as the Space Nuclear Propulsion e ffort.

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.4 Advanced Propulsion
    - TX01.4.3 Nuclear Thermal Propulsion

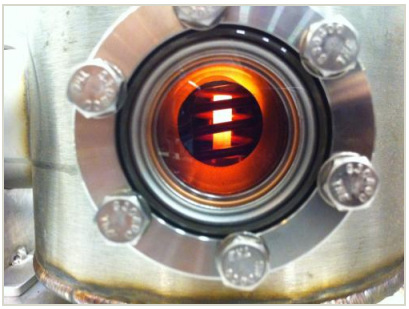
Other/Cross-cutting:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion

Target Destinations

The Moon, Mars, Others Inside the Solar System

Images



Nuclear Thermal Propulsion.jpg
Part of NASA's Game Changing Development Program, the Nuclear Thermal Propulsion (NTP) project could indeed significantly change space travel, largely due to its ability to accelerate a large amount of propellant out of the back of a rocket at very high speeds, resulting in a highly efficient, high-thrust engine. In comparison, a nuclear thermal rocket has double the propulsion efficiency of the Space Shuttle main engine, one of the hardest-working standard chemical engines of the past 40 years. That capability makes nuclear thermal propulsion ideal for delivering large, automated payloads to distant worlds.
(https://techport.nasa.gov/image/143209)

Project Website:

https://www.nasa.gov/directorates/spacetech/game_changing_development/index.html